



# COMMONWEALTH of VIRGINIA

## DEPARTMENT OF ENVIRONMENTAL QUALITY

Street address: 629 East Main Street, Richmond, Virginia 23219

Mailing address: P.O. Box 1105, Richmond, Virginia 23218

TDD (804) 698-4021

www.deq.virginia.gov

L. Preston Bryant, Jr.  
Secretary of Natural Resources

David K. Paylor  
Director

(804) 698-4000  
1-800-592-5482

### MEMORANDUM

TO:	Regional Directors
FROM:	Michael Dowd Director, Air Division <i>MD</i>
SUBJECT:	APG-353 – Alternative Fuel Permitting
DATE:	July 2, 2008
COPIES:	Rick Weeks, James Golden, Tamera Thompson, Air Permit Managers, Air Compliance Managers, Angela Jenkins, Rick Linker

#### Purpose:

The following policy provides interim guidance to air permitting staff concerning permit applicability reviews for the replacement of residual oil in industrial boilers with certain alternative fuels.

#### Background:

As part of the 2008 Legislative Implementation Plan, the Air Division has been tasked with development and issuance of interim guidance to air permitting staff concerning the implementation of Chapter 282, 2008 Acts of Assembly relating to alternative fuels and air emissions.

Chapter 282, 2008 Acts of Assembly, amended §10.1-1322.4 of the Code of Virginia as follows:

"Unless required by the federal government law or regulation, no additional permit or permit modifications shall be required by the Board, for the use, by any source, of an alternative fuel or raw material, if the owner demonstrates to the Board that as a result of trial burns at ~~their~~ *his* facility or other facilities or other sufficient data that the emissions resulting from the use of the alternative fuel or raw material supply are decreased. *To the*

*extent allowed by federal law or regulation, no demonstration shall be required for the use of processed animal fat, processed fish oil, processed vegetable oil, distillate oil, or any mixture thereof in place of the same quantity of residual oil to fire industrial boilers."*

The full text of Chapter 282, 2008 Acts of Assembly is enclosed as Attachment 1.

This interim policy will remain in effect until the minor NSR permit exemption language in 9 VAC 5-80-1320 is revised to implement the provisions of paragraph 1 of Chapter 282, 2008 Acts of Assembly.

**Applicability:**

1. This interim policy applies only to applicability reviews for fuel switches at industrial boilers conducted under 9 VAC 5 Chapter 80, Article 6. Applicability reviews subject to 9 VAC 5 Chapter 80, Article 8 and Article 9 shall be conducted in accordance with current regulations and policy.
2. This interim policy does not apply to the use of an alternative fuel or raw material that would be subject to applicability review as a modification under 9 VAC 5 Chapter 80, Article 6.
3. This interim policy applies to industrial boilers at existing sources or previously permitted stationary sources that combust residual oil. It does not apply to new industrial boilers to be constructed at existing stationary sources or new stationary sources (Greenfield).
4. This interim policy is limited to the replacement of residual oil with the same quantity of processed animal fat, processed fish oil, processed vegetable oil, distillate oil or mixture of these fuels in industrial boilers.

**Definitions:**

Unless listed below, the definitions contained in 9 VAC 5-10-20 shall be used in determining applicability of this interim policy:

1. "Existing Sources" means any stationary source which was not constructed, modified, or relocated on or after March 17, 1972 and which has never undergone preconstruction review under a new source review permit program.
2. "Previously permitted stationary sources" means any stationary source constructed, modified or relocated on or after March 17, 1972 which has been issued a permit under the minor new source review permit program.
3. "Minor new source review permit program" means the preconstruction review permit program for regulated air pollutants implemented under 9 VAC 5 Chapter 80, Article 6.
4. "Modification" means a physical change in, or change in the method of operation of, or addition to, a stationary source as defined in 9 VAC 5-80-1110 C.

5. "Industrial Boiler" means an enclosed combustion device that recirculates hot water, steam or some other heat transfer medium to produce heat or power to be used in the manufacturing, processing, mining or refining industries.
6. "Residual Oil" means fuel oil which meets the ASTM D396-07 specification for numbers 4, 5 or 6 fuel oil.
7. "Distillate Oil" means fuel oil which meets the ASTM D396-07 specification for numbers 1 or 2 fuel oil with a maximum sulfur content of 0.5%.
8. "Alternative fuel" means any of the following: processed animal fat, processed fish oil, processed vegetable oil, distillate oil or any combination of these fuels.
9. "Processed animal fat" means rendered animal fat or reprocessed cooking oils consisting of 100% triglycerides with no other contaminants and marketed under the trade names chicken fat, feed fat, yellow grease, tallow or choice white grease with a maximum sulfur content of 0.01% by weight.
10. "Processed fish oil" means oils derived from a variety of fish species consisting of 100% triglycerides with no other contaminants with a maximum sulfur content of 0.01% by weight.
11. "Processed vegetable oil" means oils derived from vegetable materials such as corn, safflower and canola, or reprocessed vegetable cooking oils consisting of 100% triglycerides with no other contaminants and a maximum sulfur content of 0.01% by weight.
12. "Fuel switch" means the replacement of residual oil with the same quantity of an alternative fuel.

**Statement of Policy:**

A project limited to the replacement of residual oil with any of the above defined alternative fuels shall not be considered a "modification", provided the project does not otherwise qualify as a modification under 9 VAC 5 Chapter 80, Article 6 and is therefore not subject to best available control technology (BACT) review required under 9 VAC 5-50-260.

**Implementation:**

1. Existing Sources, e.g. not currently permitted:

Requests for fuel switches for existing sources not currently permitted shall be reviewed as follows:



- a. Fuel switch requests should be made through submission of the Form 7 and include sufficient information to estimate emissions from use of the new alternative fuel.<sup>1</sup>
- b. For each alternative fuel, estimate the hourly emission rates for PM/PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, VOC and CO at the maximum rated capacity of the industrial boiler. Applications not containing emission factors for the alternative fuel may be calculated using emission factors contained in Attachment 2 to this policy.
- c. Determine whether the exclusion provided by subdivision 5 under the definition of “Modification” in 9 VAC 5-80-1110 C applies by comparing the estimated hourly emission rates from the alternative fuel to the hourly emission rates from residual oil firing at the maximum rated capacity of the boiler, for each pollutant.<sup>2</sup>
  - i). If the estimated hourly emission rates for the new alternative fuel are less than or equal to, the respective hourly emission rates for residual oil firing, for all pollutants, the project is not a “modification” and may be processed as an exemption.
  - ii). If the estimated hourly emission rates for the alternative fuel are greater than the hourly emission rates for residual oil, for any pollutant, the project shall be evaluated as a “modification” by calculating the net emissions increase (NEI) of each regulated pollutant to determine permitting and BACT applicability in accordance with the current minor NSR regulation, policy and guidance.<sup>3,4</sup>
- d. For projects qualifying as exemptions because they are not considered “modifications”, the memo or checklist supporting the exemption should cite this policy and exclusion provided by 9 VAC 5-80-1320 A 1 e (as modified by §10.1-1322.4 of the Code of Virginia) as the basis for the exemption:

*A. The general requirements for permit exemption levels are as follows:*

*1. The provisions of this article do not apply to the following stationary sources or emissions units:*

---

<sup>1</sup> This information is needed by DEQ to estimate emissions and facilitate CEDS emissions inventory data updates which are in turn used for annual emissions reports and if applicable, the calculation of Title V annual emissions fees.

<sup>2</sup> Subdivision 5 excludes from the definition of “modification,” use of an alternative fuel or raw material *if*, prior to the date any provision of the regulations of the board become applicable to the source type, the source was not designed to accommodate the alternative use and the owner demonstrates to the board that as a result of trial burns at the source or other sources or of other sufficient data that the emissions resulting from the use of the alternative fuel or raw material supply are decreased.”

<sup>3</sup> Refer to Memo 03-1004, “Permit and BACT applicability under Chapter 80 Article 6 Permitting”.

<sup>4</sup> A project considered a “modification” may still be exempt provided the net emissions increase for each regulated pollutant are less than the permit exemption levels listed in 9 VAC 5-80-1320 D.

*e. The use by any source of an alternative fuel or raw material, if the owner demonstrates to the board that, as a result of trial burns at their facility or other facilities or other sufficient data, the emissions resulting from the use of the alternative fuel or raw material supply are decreased.*

2. Previously Permitted Industrial Boilers:

Requests for fuel switches for previously permitted sources shall be reviewed as follows:

- a. Fuel switch requests should be made through submission of the Form 7 and should include sufficient information to estimate emissions from use of the alternative fuel. The application should also be accompanied by a redline/strike-out version of the current permit which includes proposed permit changes needed to accommodate the fuel switch.
- b. For each alternative fuel, estimate the hourly emission rates for PM/PM<sub>10</sub>, SO<sub>2</sub>, NO<sub>x</sub>, VOC and CO at the maximum rated capacity of the industrial boiler. Applications not containing emission factors for the alternative fuels may be calculated using emissions factors contained in Attachment 2 to this policy.
- c. Determine whether the exclusion provided by subdivision 5 under the definition of "Modification" in 9 VAC 5-80-1110 C applies by conducting the following evaluation:
  - i). If there are hourly emission limits in the permit, compare the estimated hourly emissions rates from the alternative fuel to the permitted hourly emissions limits for residual oil firing.
    - (a). If the estimated hourly emission rates for the alternative fuel are less than or equal to the permitted hourly emission limits for residual oil, for all pollutants, the project is not a "modification" and may be processed as a minor permit amendment in accordance with 9 VAC 5-80-1280.
    - (b). If the estimated hourly emission rates for the alternative fuel are greater than the permitted hourly emission limits for residual oil, for any pollutant, the project shall be evaluated as a "modification" by calculating the net emissions increase (NEI) of each regulated pollutant to determine permitting and BACT applicability in accordance with the current minor NSR regulation, policy and guidance.
  - ii). If there are no hourly emission limits in the permit, compare the estimated annual emission rates for the alternative fuel to the permitted annual emission limits for residual oil firing. Annual emissions calculations for the alternative fuel should be estimated by assuming the same throughput of alternative fuel as residual oil. If residual oil is not limited by the permit, emission estimates and comparisons should be based on firing both the alternative fuel and residual oil for 8760 hours at the maximum rated capacity of the boiler.



- (a). If the estimated annual emission rates for the alternative fuel are less than or equal to the permitted annual emission limits for residual oil, for all pollutants, the project is not a “modification” and may be processed as a minor permit amendment in accordance with 9 VAC 5-80-1280.
  - (b). If the estimated annual emission rates for the alternative fuel are greater than the permitted annual emission limits for residual oil, for any pollutant, the project shall be evaluated as a “modification” by calculating the net emissions increase (NEI) of each regulated pollutant to determine permitting and BACT applicability in accordance with the current minor NSR regulation, policy and guidance.
- d. For projects qualifying for minor amendments:
- i). The memo or checklist supporting the minor permit amendment should cite this policy and exclusion provided by subdivision 5 under the definition of “Modification” in 9 VAC 5-80-1110.C as the basis for the minor amendment:
 

“Use of an alternative fuel or raw material if, prior to the date any provision of the regulations of the board become applicable to the source type, the source was not designed to accommodate the alternative use and the owner demonstrates to the board that as a result of trial burns at the source or other sources or of other sufficient data that the emissions resulting from the use of the alternative fuel or raw material supply are decreased.”
  - ii). At a minimum, the following minor NSR permit terms and conditions should be revised through the minor amendment process: (Refer to Attachment 3 for examples.)
    - (a). Add the permit application date for the fuel switch request to the “Introduction” section of the permit.
    - (b). Add the alternative fuel to the list of fuels in the “approved fuel” condition.
    - (c). Include new fuel specification and certification requirements for the alternative fuel in the permit. Refer to the “Definitions” section of this policy for a description of the alternative fuel.
    - (d). Establish a fuel throughput limit for the alternative fuel equal to the residual oil throughput limit.<sup>5</sup>
    - (e). If necessary, clarify that the existing hourly and annual emission limits in the permit apply to the industrial boiler when firing either residual oil or the alternative fuel.

---

<sup>5</sup> A fuel throughput limit is not necessary if the residual oil throughput is not currently limited in the permit.

- (f). Establish recordkeeping requirements in the permit for the alternative fuel.
- iii). The fuel switch may be implemented prior to the issuance of the amended permit provided DEQ determines that the project is not a “modification” and is exempt from minor NSR permitting.

3. Changes/Rescission of Existing NSR Permit Conditions

Existing permit terms and conditions that represent prior BACT determinations are unaffected by this interim policy. Existing permit conditions established as part of a previous BACT decision may not be rescinded or made less stringent as a result of this policy.

4. Revisions to Title V Permits

For major sources currently subject to the Title V operating permit program, new applicable requirements, including new or revised minor NSR permit conditions, resulting from the fuel switch shall be incorporated into the Title V permit in accordance with current regulations and policy.

Questions or comments concerning this interim policy should be directed to Tamera Thompson, Office of Air Permit Programs at (804)-698-4502.

Attachment 1

**CHAPTER 282**

*An Act to amend and reenact § 10.1-1322.4 of the Code of Virginia, relating to alternative fuels and air emissions.*

[S 748]

Approved March 4, 2008

Be it enacted by the General Assembly of Virginia:

1. That § 10.1-1322.4 of the Code of Virginia is amended and reenacted as follows:

§ 10.1-1322.4. Permit modifications for alternative fuels or raw materials.

Unless required by ~~the federal government~~ *law or regulation*, no additional permit or permit modifications shall be required by the Board, for the use, by any source, of an alternative fuel or raw material, if the owner demonstrates to the Board that as a result of trial burns at ~~their~~ *his* facility or other facilities or other sufficient data that the emissions resulting from the use of the alternative fuel or raw material supply are decreased. *To the extent allowed by federal law or regulation, no demonstration shall be required for the use of processed animal fat, processed fish oil, processed vegetable oil, distillate oil, or any mixture thereof in place of the same quantity of residual oil to fire industrial boilers.*

2. That the Air Pollution Control Board shall adopt regulations within 180 days after enactment providing that: (i) when determining whether a physical or operational change at an existing stationary source requires a permit or permit amendment under the minor new source review regulations, any change in emissions shall be calculated as the difference between the source's pre-change and postchange annual uncontrolled emission rates; and (ii) such regulations shall remain in effect until the Board changes those provisions of its minor new source regulations concerning the manner in which such change in emissions is calculated. For purposes of clause (i), the term "uncontrolled emission rate" means the emission rate from an emissions unit when operating at maximum capacity without air pollution control equipment. Air pollution control equipment includes control equipment that is not vital to its operation, except that its use enables the owner to conform to applicable air pollution control laws and regulations. Annual uncontrolled emissions shall be based on the maximum annual rated capacity (based on 8,760 hours of operation per year) of the emissions unit, unless the emissions unit or stationary source is subject to state and federally enforceable permit conditions that limit the annual hours of operation. Enforceable permit conditions on the type or amount of material combusted, stored, or processed may be used in determining the uncontrolled emission rate of an emissions unit or stationary source. The uncontrolled emission rate of a stationary source is the sum of the uncontrolled emission rates of the individual emissions units. Secondary emissions do not count in determining the uncontrolled emission rate of a stationary source.



## Attachment 2

### Alternative Fuel Permitting Emission Factor Comparison

	Residual Oil No. 6 <sup>1</sup>	Residual Oil No. 4 <sup>1</sup>	Distillate Oil No. 2 <sup>1</sup>	Processed Animal Fat or Vegetable Oil <sup>2</sup>	Processed Fish Oil <sup>4</sup>
BTU Value (BTU/lb)	150,000	144,000	138,000	125,500 <sup>2a</sup>	132,000 <sup>5</sup>
Pollutant	Emission Factors				
	lb/1000 gals	lb/1000 gals	lb/1000 gals	lb/1000 gals	lb/1000 gals <sup>1</sup>
PM	9.91S+3.22	7	2	10 <sup>2a,b</sup>	3.1 <sup>4</sup>
PM <sub>10</sub>	8.03S+2.65	6	1	10 <sup>2a,c</sup>	3.1 <sup>4a</sup>
SO <sub>2</sub>	157S	150S	142S	1 <sup>2a,d</sup>	1.0 <sup>5a</sup>
NO <sub>x</sub>	55	20	20	31 <sup>2a,d</sup>	43 <sup>4</sup>
VOC	0.28	0.2	0.2	1.8 <sup>3</sup>	1.8 <sup>4b</sup>
CO	5	5	5	2.4 <sup>2a,e</sup>	6 <sup>4</sup>

1. AP-42, Fifth Edition: Table 3.1-1, Boilers <100 Million Btu/hr. S= wt percent sulfur content in fuel.
2. Emission factors derived from "A Demonstration of Fat and Grease as an Industrial Boiler Fuel", June 30, 2002, University of Georgia
  - a. Tables 2 and 3: Derived from unblended animal fat/cooking oil products with a BTU/lb ranging from 16,673-16,920, specific gravity of 0.89 and maximum sulfur content by wt. of 0.01%.
  - b. "Emission Rate Determination" table, Boiler No. 2: Run 11- Chicken Fat. Emission factor includes non-condensable and condensable (organic and inorganic) particulate matter.
  - c. For estimation purposes, assume PM<sub>10</sub> emission factor is equivalent to PM emission factor.
  - d. "Emission Rate Determination" table, Boiler No. 2: Run 1- Chicken Fat.
  - e. "Emission Rate Determination" table, Boiler No. 2: Run 4 - Yellow Grease.
3. Stack Test Data, Valley Proteins, Wadesboro, NC (<http://www.valleyproteins.com/biofuel.asp>)
4. Stack Test Data, Kodiak Fishmeal Company, July 18, 1995
  - a. For estimation purposes, assume PM<sub>10</sub> emission factor is equivalent to PM emission factor.
  - b. No data. For estimation purposes, use VOC emission factor derived from animal fat/cooking oil products.
5. See "Fish Oil Characterization" from "Demonstrating the Use of Fish Oil as Fuel in a Large Stationary Diesel Engine", J.A. Steigers.
  - a. SO<sub>2</sub> emission rate derived assuming a density of 7.7 lbs/gallon and maximum sulfur content by wt. of 0.01%.

---

## Attachment 3

### Alternative Fuel Permitting Examples of Permit Revisions to allow Alternative Fuel (distillate oil) (Revisions are marked with ~~strike through~~ and underline.)

#### 1. Approved Fuel Condition:

Fuel – The approved fuels for the two Cleaver Brooks boilers (B-1 and B-2) are residual oil (No. 6) and distillate oil. A change in fuels may require a permit to modify and operate.  
(9 VAC 5-80-1180)

#### 2. Fuel Throughput:

Fuel Throughput – The total combined annual fuel throughput for the two industrial boilers (B-1 and B-2) shall be limited to no more than 500,000 gallons per year of residual oil or distillate oil, calculated monthly as the sum of each consecutive 12-month period  
(9 VAC 5-80-1180)

#### 3. Fuel Certification:

Fuel – The ~~residual oil~~ fuels shall meet the specifications below:

RESIDUAL OIL which meets the ASTM D 396 specifications for numbers 4, 5, or 6 fuel oil:

Maximum sulfur content per shipment: 2.5%

DISTILLATE OIL which meets the ASTM D 396 specifications for numbers 1 or 2 fuel oil:

Maximum sulfur content per shipment: 0.5%

(9 VAC 5-80-1180)

#### 4. Emission Limitations:

Annual Emission Limits - Total emissions from the operation of the two Cleaver Brooks boilers (B-1 and B-2) when combusting residual oil and distillate oil shall not exceed the limits specified below:

Particulate Matter (PM) 12.0 tons/yr

PM-10 11.3 tons/yr

---

Sulfur Dioxide	90.0 tons/yr
Nitrogen Oxides (as NO <sub>2</sub> )	72.0 tons/yr
Carbon Monoxide	6.4 tons/yr
Volatile Organic Compounds	0.9 tons/yr

Annual emissions shall be calculated monthly as the sum of each consecutive 12-month period. These emissions are derived from the estimated overall emissions contribution from operating limits. Exceedance of the operating limits shall be considered credible evidence of the exceedance of emission limits. (9 VAC 5-80-1180 and 9 VAC 5-50-260)

5. Records and Reporting:

On Site Records - The permittee shall maintain records of emission data and operating parameters as necessary to demonstrate compliance with this permit. The content and format of such records shall be arranged with the Director, <insert> Region. These records shall include, but are not limited to:

- a. The monthly and annual throughput of residual oil (No. 6) used in the two industrial boilers (B-1 and B-2), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
- b. The monthly and annual throughput of distillate oil used in the two industrial boilers (B-1 and B-2), calculated monthly as the sum of each consecutive 12-month period. Compliance for the consecutive 12-month period shall be demonstrated monthly by adding the total for the most recently completed calendar month to the individual monthly totals for the preceding 11 months.
- c. Emission calculations demonstrating compliance with annual emission limitations in Condition 4.
- d. All visible emission evaluations and stack test results.
- e. Fuel specification test results and certifications including sulfur content and heating value.



---

These records shall be available for inspection by the DEQ and shall be current for the most recent five years.

(9 VAC 5-80-1180 and 9 VAC 5-50-5)